The growth stage of Japanese game apps market: A case study and simulation

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1. Motivation

the game apps targeting smartphone users grew rapidly and achieved the top share of the video game market.

2. Model

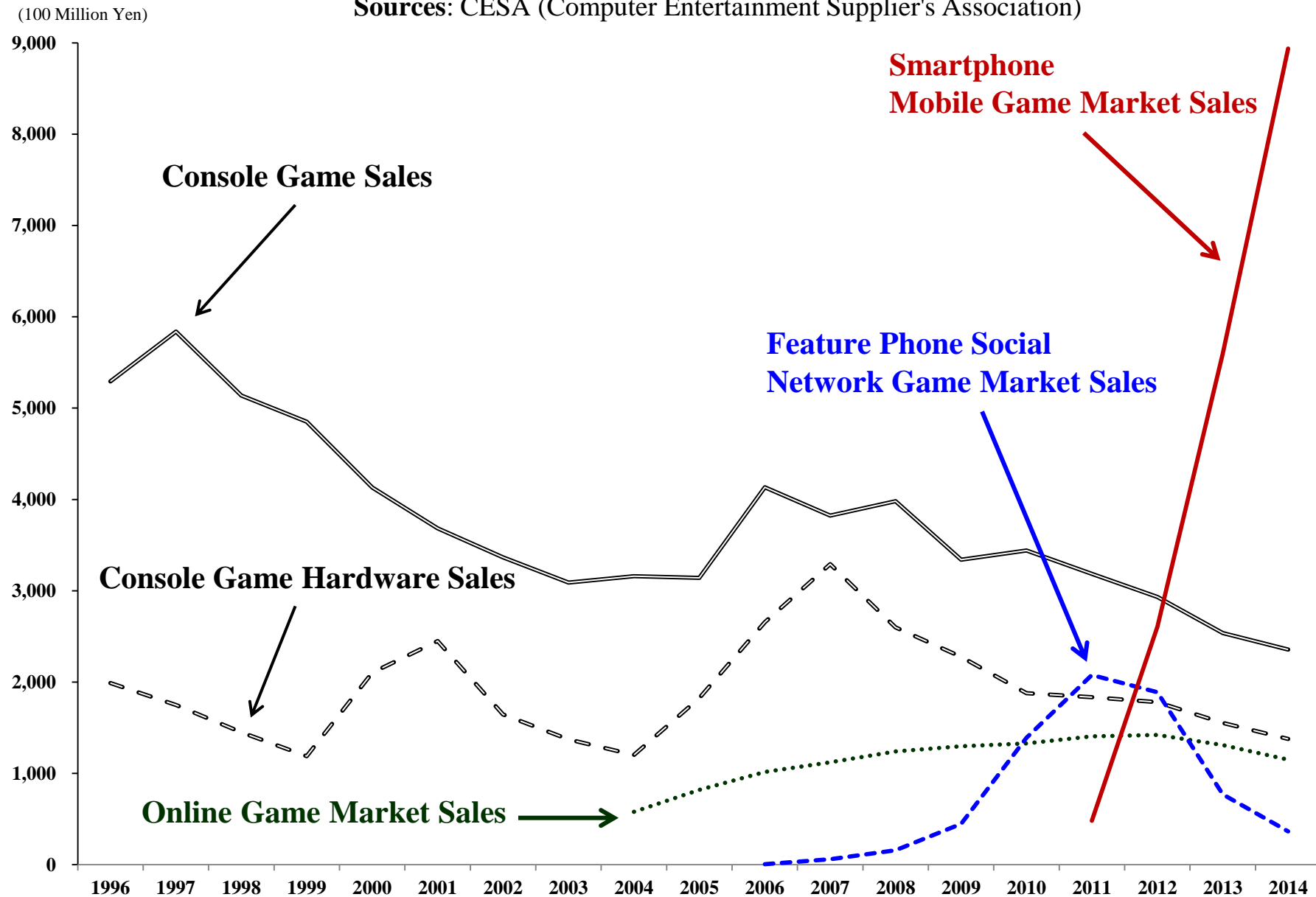Integration with Bass model (1969) and multihoming users (Evans, 2003; Armstrong, 2006)

3. Simulated results

MAU(Monthly Active Users) rates scenarios of "Puzzle & Doragons (Puzdra)" and "Moster Strike (Monst)"

4. Summary and limitations of current study

Japanese video game market

(100 Million Yen)

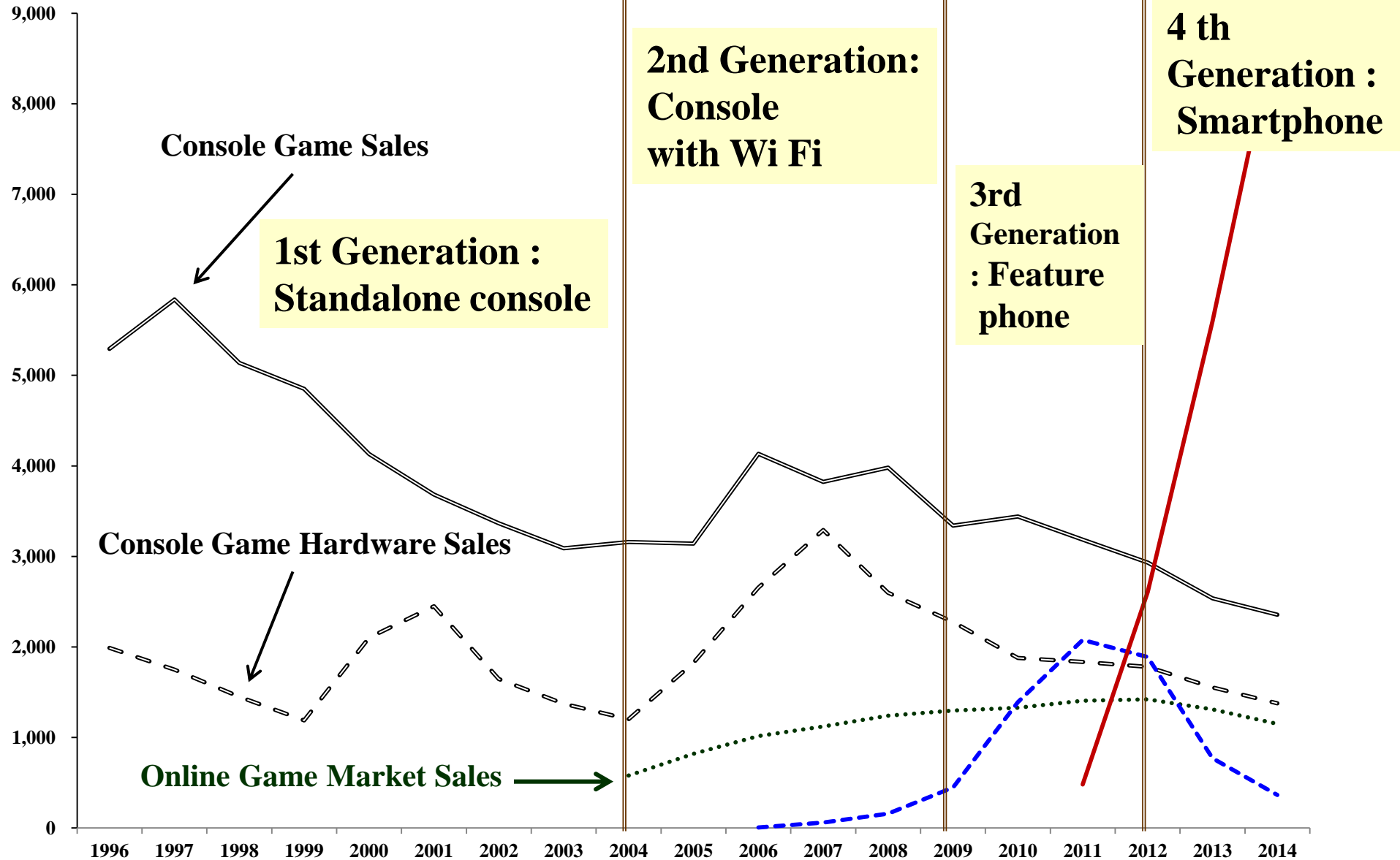**Sources**: CESA (Computer Entertainment Supplier's Association)

Smartphone Mobile Game Market Sales

Console Game Sales

Feature Phone Social Network Game Market Sales

Console Game Hardware Sales

Online Game Market Sales

4 Generations of video game platforms ⁽⁴⁾

(100 Million Yen)

Sources: CESA (Computer Entertainment Supplier's Association)

Console Game Sales

1st Generation : Standalone console

2nd Generation: Console with Wi Fi

3rd Generation : Feature phone

4 th Generation : Smartphone

Console Game Hardware Sales

Online Game Market Sales →

9,000	
8,000	
7,000	
6,000	
5,000	
4,000	
3,000	
2,000	
1,000	
0	

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

「モンスト」が日本の売上トップアプリに

"Finally 'Monst' exceeds 'Pazdora', in Japan sales top app

Daily top sales rank chart in 2014

App Store
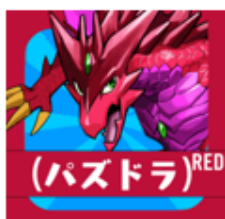
	Monster Strike	Puzzle & Dragons
1月	0	31
2月	0	28
3月	0	31
4月	0	30
5月	1	30
6月	0	30
7月	5	26
8月	3	28
9月	11	17
10月	15	16
11月	**16**	**13**

January
February
March
April
May
June
July
August
September
November

Google Play

	Monster Strike	Puzzle & Dragons
1月	0	31
2月	0	28
3月	0	31
4月	0	30
5月	0	31
6月	0	30
7月	3	28
8月	2	29
9月	4	26
10月	**16**	**15**
11月	**18**	**12**

January
February
March
April
May
June
July
August
September
November

(http://www.metaps.com/press/ja/blog-jp/159-1204jptrends)

Puzzle & Dragons
(GungHo Online Ent., Feb. 20, 2012)

Monster Strike(mixi,Inc. Oct.10, 2013)⁽⁷⁾

（http://www.appbank.net/2014/01/27/iphone-application/739909.php）

（http://www.appbank.net/2014/03/21/iphone-application/771268.php）

Revenue model (item-based payment) [(8)]

【Puzzle & Dragons】(Puzdra)

【Monster Strike】(Monst)

Magic stone

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スタミナ あと 5: 17 19/23 876

戻る 魔法石ショップ

価格: ¥500 購入
魔法石 12個 価格: ¥900 購入
魔法石 30個 価格: ¥2,000 購入
魔法石 60個 価格: ¥3,800 購入
魔法石 85個 価格: ¥5,000 購入

App Storeで魔法石を購入

ダンジョン モンスター ショップ ガチャ フレンド その他

Orb

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スタミナ 1:06 6/51 1972850

戻る オーブ購入 購入

オーブ 6個 ¥500 購入
オーブ 12個 ¥900 購入
オーブ 30個 ¥2,000 購入
オーブ 60個 ¥3,800 購入
オーブ 85個 ¥5,000 購入

す。未成年の方は必ず親権者の許可を取って

ホーム クエスト モンスター ショップ ガチャ フレンド

The first partner candidates

【**Puzzle & Dragons**】**(Puzdra)**

【**Monster Strike**】**(Monst)**

戻る パートナー選択

ティラ

プレシィ

ブラッキィ

トナーとなるドラゴンを選んでください。

戻る 最初のモンスター

レッドリドラ

ブルーリドラ

グリーンリドラ

Puzdra TV CM (from Oct.15th, 2012)[10]

"Puz"

パズル家
御曹司 パズ

"Dra"

育成RPG家
御令嬢 ドラ

パズドラ
PUZZLE & DRAGONS

Monst TV CM (March 1st, 2014)
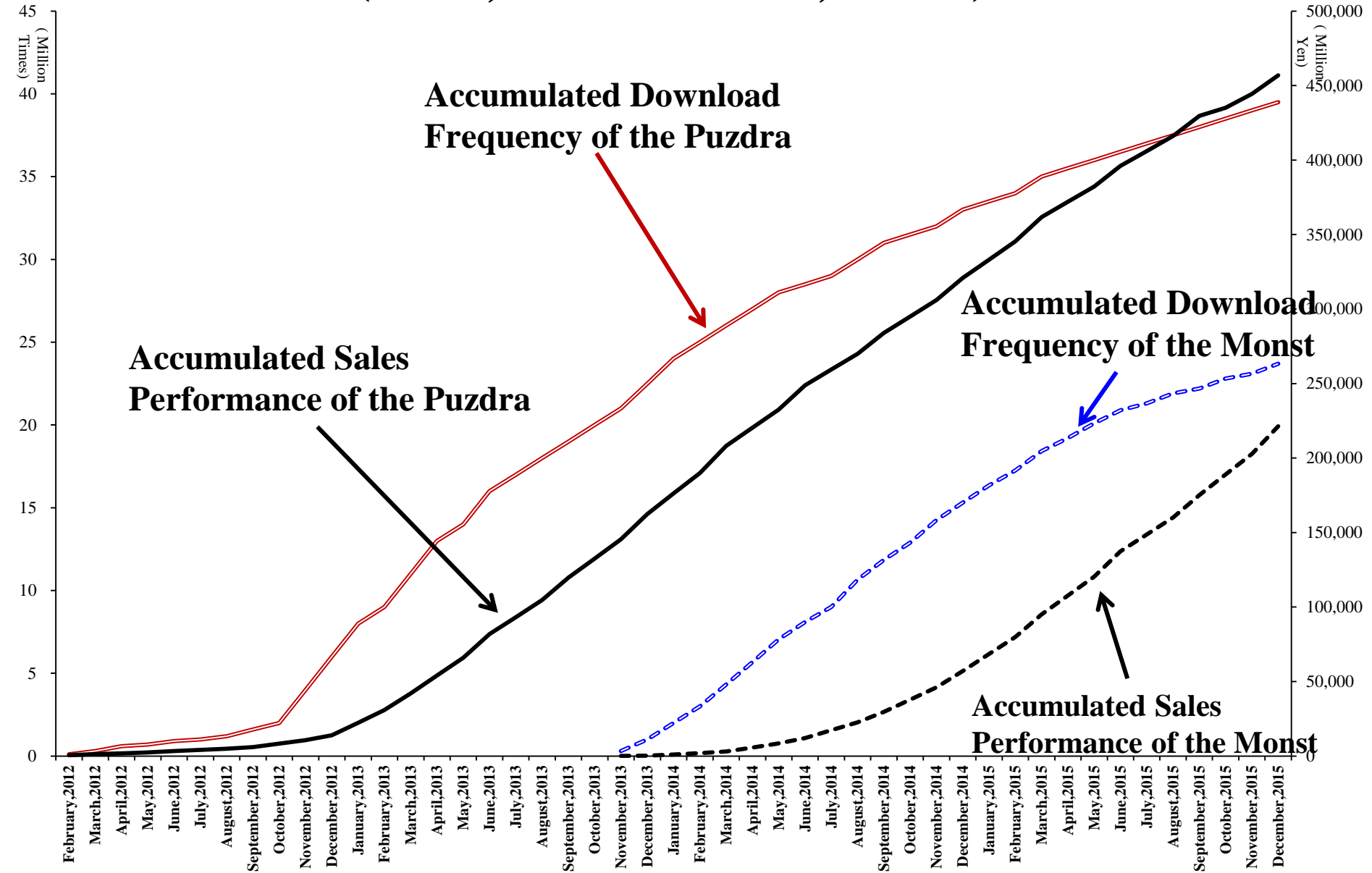
Class room in the high school

Izakaya (Japanese-style bar)

Pajama party by female undergraduates

Accumulated performance of Puzdra and Monst (Feb., 2012 – Dec., 2015)

Accumulated Download Frequency of the Puzdra

Accumulated Sales Performance of the Puzdra

Accumulated Download Frequency of the Monst

Accumulated Sales Performance of the Monst

	Lean startup strategy	Imitation strategy
Definition	To adopt a lean startup methodology (Ries, 2011) and attaining a first-mover advantage for the game apps business.	To achieve a latecomer advantage as an opposite concept to the lean startup strategy for the game apps business.
Description	To develop the game apps as a "minimum viable product," distributed free of charge, and updated frequently, through the version-up process, game apps are improved and made more sophisticated. To monetize as an implementation of the freemium revenue model at the appropriate time.	To develop the game apps imitating and reinventing the functions of advanced game apps and reinventing for the differentiation.
Risk	The deliverables are so precisely lean artifacts and a business structure that are logical and preferable to customers, that they are likely to be imitated.	An extremely explicit imitation has the risk of being regarded as copyright infringement.
Related Literature	Ries (2011) Blank (2013) Eisenmann, Ries, Dillard (2013)	Schnnars (1994) Shenkar (2010) Staykova and Damsgaard (2015)
Example	Puzzle and Dragons (Puzdra)	Monster Strike (Monst)

Research Questions

1. How can we examine the marketing in the growth stage of the game apps business by the limited disclosure of sales data ?

2. How can we clarify the transition of the key performance indicators (KPIs) for the game apps business by the limited disclosure of sales data?

3. What are the differences of competitive advantage between the the lean startup strategy and imitation strategy for the game apps business ?

Modeling and Simulations

Basic Formula to game app business

registered users   = INTEG (– new registered users)
free users   = INTEG (new actual users – free escapee)
paid users   = INTEG (new paid users – paid escapee)
Accumulated sales performance
                = INTEG (monthly sales performance)

new registered users = number of monthly downloads
                = advertising effect + WOM effect
new actual users = registered users * MAU rate
                                (MAU: Monthly Active Users)
free escapee = free users – exit rate of free users
new paid users = free users * rate of charge
paid escapee = paid users – exit rate of paid users

monthly sales performance = paid users
                * monthly purchase amounts
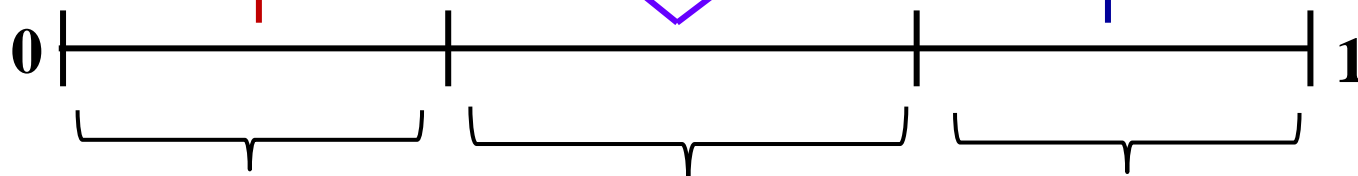
Users: single homing and multihoming

multihoming costs (usage fees and learning times at the same times) are comparatively low..

service provider side
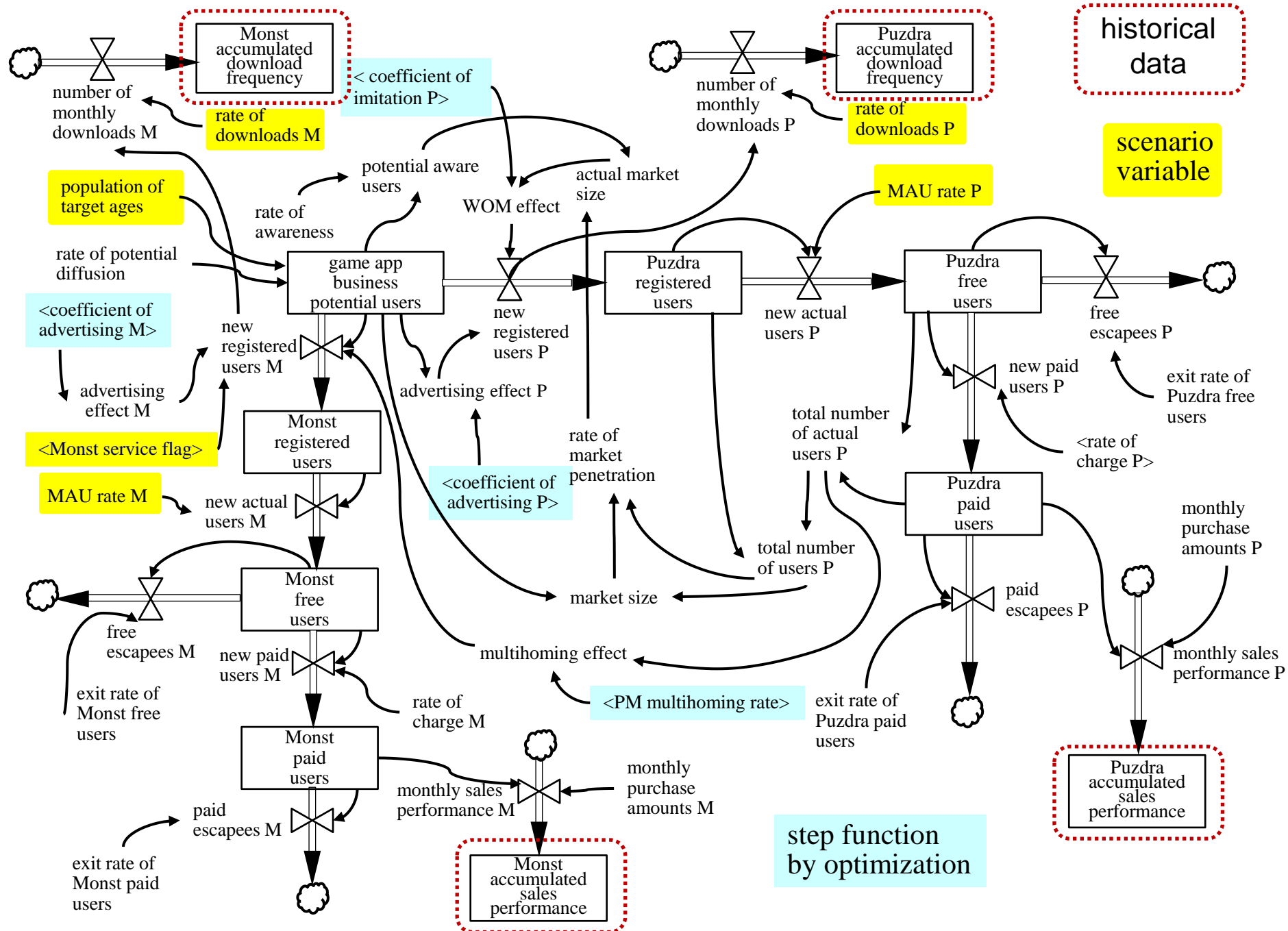
Puzzle & Dragons (Puzdra)

Monster strike (Monst)

consumer side

0 ——————————————————————— **1**

single homing (Puzdra users)

multihoming (both games apps users)

single homing (Monst users)

historical data

scenario variable

Monst accumulated download frequency

number of monthly downloads M

rate of downloads M

< coefficient of imitation P >

population of target ages

potential aware users

rate of awareness

WOM effect

actual market size

number of monthly downloads P

rate of downloads P

Puzdra accumulated download frequency

MAU rate P

rate of potential diffusion

<coefficient of advertising M>

new registered users M

advertising effect M

game app business potential users

new registered users P

rate of market penetration

new actual users P

Puzdra registered users

Puzdra free users

free escapees P

new paid users P

exit rate of Puzdra free users

<Monst service flag>

MAU rate M

Monst registered users

new actual users M

advertising effect P

<coefficient of advertising P>

total number of actual users P

<rate of charge P>

Puzdra paid users

monthly purchase amounts P

free escapees M

exit rate of Monst free users

Monst free users

new paid users M

rate of charge M

total number of users P

market size

multihoming effect

<PM multihoming rate>

paid escapees P

exit rate of Puzdra paid users

monthly sales performance P

Monst paid users

paid escapees M

exit rate of Monst paid users

monthly sales performance M

monthly purchase amounts M

Monst accumulated sales performance

step function by optimization

Puzdra accumulated sales performance

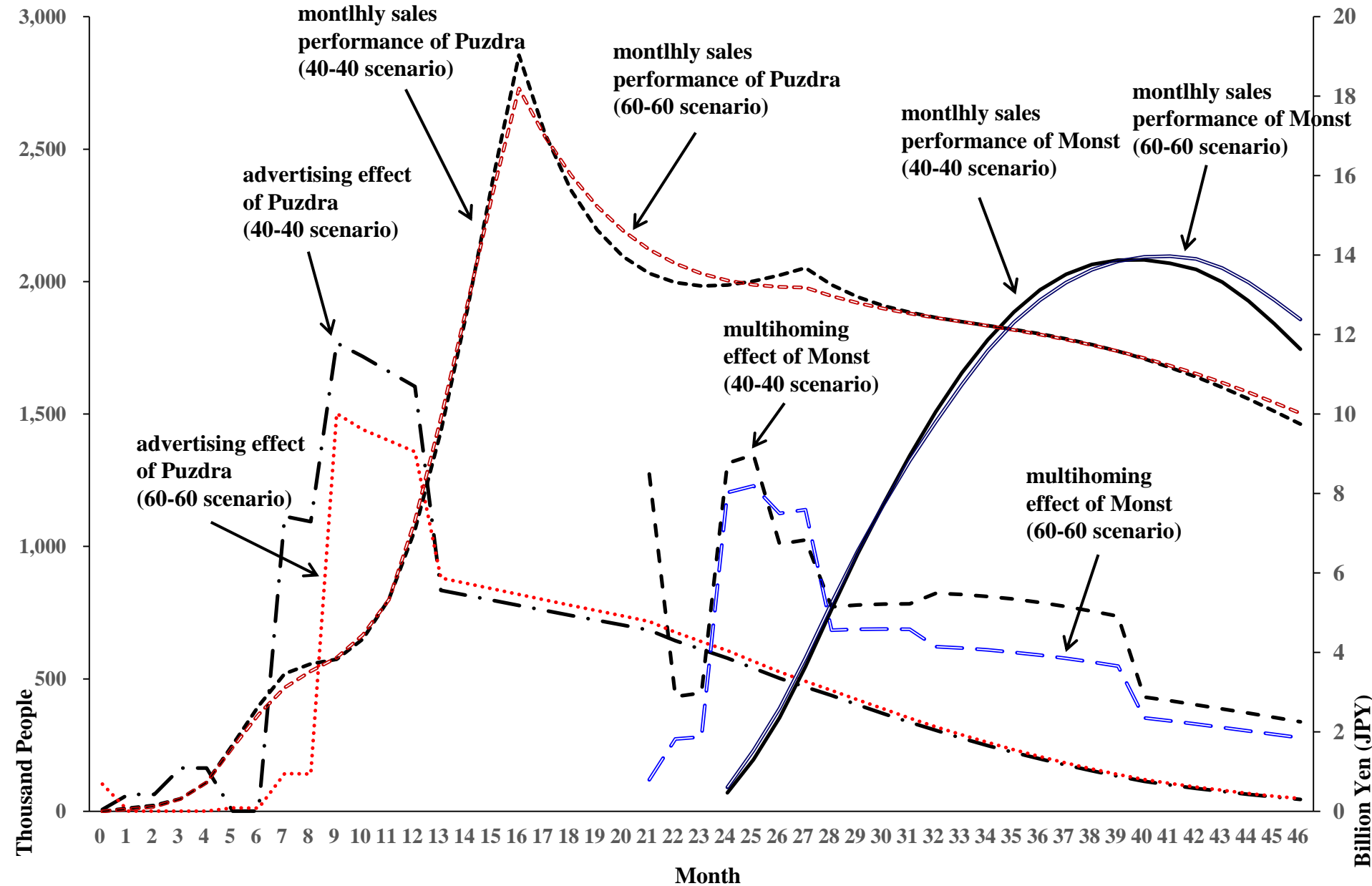|	40-40 scenario	60-60 scenario	80-80 scenario
payoff value of parameter estimation	-0.0023	-0.0025	-0.0024
rate of potential diffusion	85%	85%	85%
rate of awareness	17.89%	13.94%	10.72%
game app business potential users	64,427,452	64,427,452	64,427,452
MAPE of Puzdra accumulated sales performance	16.11%	16.14%	15.19%
MSE of Puzdra accumulated sales performance into bias (U^m)	0.083	0.024	0.0346
MSE of Puzdra accumulated sales performance into unequal variances (U^s)	0.033	0.1244	0.0647
MSE of Puzdra accumulated sales performance into unequal covariation (U^c)	0.8838	0.8516	0.9007
MAPE of Puzdra accumulated download frequency	12.85%	13.8%	19.26%
MSE of Puzdra accumulated download frequency into bias (U^m)	0.0111	0.0304	0.0268
MSE of Puzdra accumulated download frequency into unequal variances (U^s)	0.0794	0.079	0.1356
MSE of Puzdra accumulated download frequency into unequal covariation (U^c)	0.9095	0.8906	0.8376
Puzdra accumulated sales performance (JPY)	457,997,811,712	458,983,899,136	459,565,793,280
Puzdra accumulated download frequency	38,046,088	38,036,116	38,050,368
monthly purchase amounts P (JPY)	5,296.6	3,491.26	2905.63
exit rate of Puzdra free users	4.99%	5.51%	5.58%
exit rate of Puzdra paid users	17.1%	9.85%	8.98%
contribution of advertising effect to the total number of Puzdra registered users	61.21%	54.42%	62.02%
contribution of word-of-mouth effect to the total number of Puzdra registered users	38.79%	45.58%	37.98%
MAPE of Monst accumulated sales performance	13.99%	12.18%	11.85%
MSE of Monst accumulated sales performance into bias (U^m)	0.0832	0.0841	0.0438
MSE of Monst accumulated sales performance into unequal variances (U^s)	0.033	0.0272	0.0817
MSE of Monst accumulated sales performance into unequal covariation (U^c)	0.8838	0.8887	0.8745
MAPE of Monst accumulated download frequency	2.73%	0.35%	2.15%
MSE of Monst accumulated download frequency into bias (U^m)	0.0155	0.0314	0.0198
MSE of Monst accumulated download frequency into unequal variances (U^s)	0.1399	0.1778	0.1291
MSE of Monst accumulated download frequency into unequal covariation (U^c)	0.8446	0.7908	0.8511
Monst accumulated sales performance (JPY)	215,604,805,632	216,723,570,688	217,599,311,872
Monst accumulated download frequency	23,516,890	23,498,646	23,522,644
monthly purchase amounts M (JPY)	5,760.11	9,446.11	39,993.4
rate of charge M	15.95%	8.35%	1.65%
exit rate of Monst free users	1%	40%	40%
exit rate of Monst paid users	40%	10.69%	10.13%
contribution of advertising effect to the total number of Monst	20.50%	54.42%	54.02%

Simulated results of the 60-60 scenario

Puzdra accumulated Sales Performance（simulated）

Puzdra accumulated download frequency（simulated）

Monst accumulated download frequency（simulated）

Puzdra accumulated download frequency（data）

Puzdra accumulated Sales Performance（data）

Monst accumulated Sales Performance（data）

Monst accumulated download frequency（data）

Monst accumulated Sales Performance（simulated）

Million Times

Million Yen (JPY)

Month

KPI transition of 40-40 / 60-60 scenarios [21]

Million People (y-axis)

Month (x-axis)

Puzdra free users (60-60 scenario)

Puzdra free users (40-40 scenario)

Monst free users (40-40 scenario)

Puzdra paid users (60-60 scenario)

Monst paid users (40-40 scenario)

Puzdra paid users (40-40 scenario)

Monst free users (60-60 scenario)

Monst paid users (60-60 scenario)

Effects, monthly sales performance of 40-40/60-60 scenarios

Effects, monthly sales performance of 40-40/60-60 scenarios. Labels: montlhly sales performance of Puzdra (40-40 scenario); montlhly sales performance of Puzdra (60-60 scenario); montlhly sales performance of Monst (40-40 scenario); montlhly sales performance of Monst (60-60 scenario); advertising effect of Puzdra (40-40 scenario); advertising effect of Puzdra (60-60 scenario); multihoming effect of Monst (40-40 scenario); multihoming effect of Monst (60-60 scenario). Y-axis left: Thousand People (0–3,000). Y-axis right: Billion Yen (JPY) (0–20). X-axis: Month (0–46).

Key results by the cases and simulations

I. The number of potential users for the game apps business of more than 64 million people—equivalent to approximately 85% of the productive population in Japan—is anticipated.

II. More than five months have passed since the service start of the game app, the advertising effects of the TV commercials can work well on potential users.

III. The number of Puzdra free users is always higher than that of Monst.

IV. The monthly purchase amount M (ARPPU of Monst) and the exit rate of Monst paid users are higher than those for Puzdra.

V. Approximately half the number of new registered users of Monst are multihoming users.

VI. Monst monthly sales amounts exceed Puzdra monthly sales amounts from January 2015.

The limitations of current study

1. <u>The credibility of data</u>: GungHo may indicate the download frequency by counted multiple times for a user. (mixi stated that download frequency is counted only once for every user.)

2. <u>The time-independent parameters for the model</u>: coefficient of advertising, coefficient of imitation and mutihoming rate are not the constants but the time-step functions.

3. <u>The less feedback mechanism</u>: the multihoming effect from the Puzdra users to Mont users is treated as an unidirectional one.

4. <u>Frontier disadvantage is supported</u>: the competitive advantages of the lean startup strategy against the imitation strategy for the game apps business are not identified.

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